

DRAFT
June 1, 1998

**Multi-Objective Approaches To Floodplain Management
On A Watershed Basis:
Preliminary Glossary**

Attached is a first draft of a floodplain management glossary. We did not have an initial list of terms to start with; instead these terms were gleaned through a literature review and from other sources. OPR also included a glossary of terms in their draft write-up; their terms are included in this glossary as well.

For convenience, the glossary has been divided into two parts: Physical Characteristics and Planning/Economic Considerations. In some cases several definitions for a term were found, and all of these are shown. The Interagency Floodplain Management Group can decide which definition is the most appropriate. The source of the definition is indicated in parenthesis.

Floodplain Management Glossary

Physical Characteristics

Base Flood

The flood having a one percent chance of being equaled or exceeded in magnitude in any given year. (Also known as the 100-Year Flood). This is the flooding event that is used to calculate flood risk for the National Flood Insurance Program and the Federal Emergency Management Agency. (OPR)

Base Flood Protection

The height (above sea-level) that flood waters will reach at a given location in the event of the base (100-year) flooding event. (OPR)

Conveyance

A measure of the water carrying capacity of a stream reach. (OPR)

Downstream

That portion of the watershed located below a particular point on a stream or river.

Drainage Basin

A part of the watershed that is occupied by a drainage system or contributes surface water to that system. (Amer. Geologic Institute)

Encroachment

Any man-made obstruction in the floodplain which displaces the natural passage of flood waters. (OPR)

Flood

An overflow of lands which, although they are adjacent to water, are not normally covered by it, and hence are used (or usable) in the same way that other lands are used. (James and Lee, Economics of Water Resources Planning)

Floodplain

Several definitions were found:

- That portion of a river valley, adjacent to the river channel, which is built of sediments during

the present regimen of the stream and which is covered with water when the river overflows its banks at flood stage. (Amer. Geologic Institute)

- The lowland adjacent to a river, lake or ocean. (Floodplain Management Website)
- Floodplains are designated by the rarity of the flood that is large enough to inundate them. For example, the 10-year floodplain can be inundated by the 10-year flood and the 100-year floodplain by the 100-year flood. (Floodplain management Website)
- Any area susceptible to inundation by flood water from any source. (OPR)

Floodway

The channel of a river or watercourse and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot.

Flood Boundary and Floodway Map

A floodplain management map issued by Federal Emergency Management Agency that shows, based on detailed and approximate analyses, the boundaries of the 100-year and 500-year floodplains and the 100-year floodway. (OPR)

Flood Damage

Losses caused by physical contact with the flood and are generally evaluated as the cost of replacing, repairing, or rehabilitating the affected property in the case of urban damages and as the net effect on farm income in the case of crop damages. (James and Lee, Economics of Water Resources Planning)

Flood Frequency

Over a period of years, the average number of times a flood of a given magnitude is likely to occur. (Amer. Geologic Institute)

Flood Fringe

That portion of the 100-year floodplain outside the floodway in which total encroachment is permissible. (OPR)

Flood Hazard Boundary Map (FHBM)

The initial insurance map issued by FEMA that identifies approximate areas of 100-year flood hazard in a community. (OPR)

Flood Insurance Rate Map (FIRM)

The insurance and floodplain management map issued by FEMA that identifies areas of 100-year flood hazard in a community. In some areas, the map also shows base flood elevations and 500-year floodplain boundaries and occasionally, regulatory floodway boundaries. (OPR)

Flood Insurance Study

An engineering study performed by FEMA to identify flood hazard areas, flood insurance risk zones, and other flood data in a community.

Floodplain Functions

Several definitions were found:

- Floodplain functions exist in the absence of society and normally are part of the self-sustaining properties of an ecosystem. (Adapted from definition of watershed functions, Environmental Law Institute)
- Normal or characteristic natural processes that take place in wetland ecosystems, or simply the things floodplains do. (Adapted from Environmental Law Institute)
- Examples of functions include: flood control, erosion control, water supply/quality, fish/wildlife habitat, recreation, cultural/social, agriculture/forestry/fisheries, and navigation/transportation. (Adapted from different sources)

Flood Peak

The maximum rate of flow attained at a given point during a flood event.

Flood Proofing

Actions by individuals or small groups within the floodplain to reduce flood damage to their property. (James and Lee, Economics of Water Resources Planning)

Flood Severity

The primary measure of spot flood severity is depth of flooding. The total severity of a flood event depends upon the areal extent of flooding to each depth. (James and Lee, Economics of Water Resources Planning)

Flood Types

The State Flood Hazard Mitigation Plan identifies four types of floods:

- Coastal flooding and erosion: Coastal flooding and erosion present some of the most complex and serious high-risk problems. In California, coastal erosion is most often caused by a

combination of factors: winter storms, rising sea levels, tidal action, currents and waves, and high winds.

- Riverine flooding on rivers and small streams: Riverine flooding, the most common type of flooding in the state, occurs when a stream channel fills with more water than it can carry. The water rises and flows over the channel banks onto the adjacent floodplains.
- Tsunamis: Tsunamis, or seismic sea waves, are usually created by undersea earthquakes or landslides. Waves are generated by a crustal disturbance giving a vertical impulse to the sea surface. These are long-period waves that travel long distances at speeds up to 600 miles per hour with little or no loss of energy. When tsunami waves approach a coastal region in which water depth decrease rapidly, their height is increased by refraction, shoaling, and local bay or harbor conditions, and speed is decreased. Tsunamis frequently arrive in a series of spaced intervals.
- Lake flooding: Lake level fluctuations primarily concern shoreland property owners, but impact local, state and federal agencies with regulatory or financial responsibilities for water and related land uses associated with lakes. Both natural and human actions cause changing lake levels. Natural factors include direct precipitation, surface runoff, groundwater inflow, ice formation, aquatic growth, meteorological disturbances, and in larger lakes, tidal and crustal movement. Human factors include dredging, diversion, consumptive use and intruding structures.

Hydrology

The science dealing with the properties, distribution and circulation of water. (Environmental Law Institute)

Inundation

A condition in which water from any source temporarily or permanently covers a land surface. (Environmental Law Institute)

One-Hundred Year Flood

The flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. (OPR)

One-Hundred Year Flood Floodplain

The area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. (OPR)

Reach

A continuous segment of a watercourse. (OPR)

Site

The smallest geographical delineation is the site, which is not based on hydrography, but represents an area that is appropriate to an existing or proposed use. (USGS)

Standard Project Flood

USACE term based on "the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved, excluding extraordinarily rare combinations. (James and Lee, Economics of Water Resources Planning)

Sheet Flood Hazard

A type of flood hazard with flooding depths of 1 to 3 feet that occurs in areas of sloping land. The sheet flow hazard is represented by the zone designation AO on the Flood Insurance Rate Map (FIRM). (OPR)

Special Flood Hazard Area

The darkly shaded area on the Flood Hazard Boundary Map (FHBM) or Flood Insurance rate Map identifies an area that has a one percent chance of being flooded in any given year (100 year floodplain). The FIRM identifies these shaded areas as FIRM Zones A, AO, AH, A1-A30, AE, A99, V, VI-30 and VE. (OPR):

- Zone A (Unencumbered): Subject to inundation from the 100-year flood. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are shown. Mandatory flood insurance purchase requirements apply.
- Zone AE and A1-30: Subject to inundation by the 100 year flood determined in a Flood Insurance Study by detailed methods. Base flood elevations are shown within these zones. Mandatory flood insurance purchase requirements apply.
- Zone AH: Subject to inundation by the 100 year shallow flood (usually areas of ponding) where average depths are between one and three feet. Base flood elevations derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements apply.
- Zone AO: Subject to inundation by the 100 year shallow flood (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood elevations derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance

purchase requirements apply.

- Zone AR: Areas in the process of restoring flood protection where a FIRM has lost accreditation.
- Zone B, C, and X: Areas that have been identified in the community flood insurance study as areas of moderate or minimal hazard from principal source floods in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. Flood insurance is available in participating communities but is not required by regulation in these zones. Zone X is used on new and revised maps in place of Zones B and C.
- Zone D: Unstudied areas where flood hazards are undetermined but flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

Planning/Economic Considerations

Accounts

Four planning accounts are established by the 1983 Federal Economic and Environmental Principles and Guidelines to facilitate the evaluation and display of the effects of alternative plans. The NED account is required. Other information that is required by law or that will have a material bearing on the decision making process should be included in the other accounts, or in some appropriate format used to organize information on effects (USACE Planning Guidance):

- National Economic Development (NED): This account measures the increase in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the Nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also those that may not be marketed.
- Environmental Quality (EQ): This account displays non-monetary effects on significant natural and cultural resources.
- Regional Economic Development (RED): This account displays changes in the distribution of regional economic activity. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output and population.
- Other Social Effects (OSE): This account displays effects that are relevant to the planning process, but are not reflected in the other accounts.

Benefit/Cost Analysis

A tool of economic analysis used to determine whether the social benefits of a proposed project or plan outweigh its social costs over its life expectancy. Benefits are measured in terms of what society is actually willing to pay for goods and services. Costs refer not only to the number of dollars that will have to be paid to implement the plan, but also to the values of the opportunities that will be sacrificed if the plan is implemented. The benefits and costs of a project can be displayed as either the quotient of benefits divided by costs (the benefit/cost ratio), or the

difference between benefits and costs (net benefits). (L. Anderson, B/C Analysis: A Practical Guide, USACE Planning Manual)

Benefit/Cost Analysis Framework

Illustrates the “logic” of the benefit/cost analysis by showing the detailed progression of steps to identify the physical effects of proposed plans or actions and their corresponding socioeconomic consequences, and how these can be measured and valued.

Cost Effectiveness Analysis

A tool of economic analysis used to determine the least cost method of accomplishing a given objective. Costs refer not only to the number of dollars that will have to be paid to implement the plan, but also to the values of the opportunities that will be sacrificed if the plan is implemented. (Adapted from USACE Planning Manual)

Economic Analysis

The objective of economic analysis is to determine if a project represents the best use of resources over its life expectancy (i.e., the project is economically feasible). Two common tools of economic analysis are benefit/cost and cost effectiveness analyses.

Economic and Environmental Principles and Guidelines for Water and Related Land resources Implementation Studies

established in 1983, the P&G are intended to ensure proper and consistent planning by Federal agencies in the formulation and evaluation of water and related land resources implementation studies. The P&G establish the Federal Objective of water and related land resources project planning, which is to contribute to national economic development consistent with protecting the Nation’s environment, pursuant to national environmental statutes, applicable executive orders, and other Federal requirements. (USACE Planning Manual)

Environmental Restoration Plan

A Federal plan that is selected for implementation based upon the incremental costs of achieving different environmental restoration objectives which can not be valued in the traditional national economic development account process. (USACE Evaluation of Environmental Investments Procedures Manual)

Financial Analysis

An analysis of the actual monetary flows from and to specific individuals or groups of individuals

within society resulting from the implementation of a project or action. Financial analysis focuses only upon those goods and services for which people pay or are paid, e.g. for labor, capital and land. Financial analyses are always done from a specific perspective—government agency, private firm or individual, corporation, etc. A project is financially feasible if sufficient funds can be raised to pay for project installation and operational costs. It is possible for a project to be financially feasible and economically infeasible, or vice versa. (Adapted from H. Gregerson, Economic Assessment of Forestry Project Impacts)

Floodplain Management

The operation of an overall program of corrective and/or preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control work, and floodplain management regulations. (OPR)

Floodplain Values

Several definitions were found:

- Floodplain values are the goods and services that emanate from functions. (Adapted from definition of wetland functions, Environmental Law Institute)
- Those aspects of floodplains that are deemed worthy, desirable, or useful to humans. Floodplain values emanate from their functions. (Adapted from definition of wetland functions, Environmental Law Institute)
- Floodplain values reflect society's willingness to pay for functions provided by floodplains. (Mine...)

Incremental Cost Analysis

Incremental cost is the change in cost that results from a decision. In the context of environmental planning, incremental cost is the additional cost incurred by choosing to select one plan instead of another. Incremental cost is computed by subtracting the cost of the last alternative under consideration from the cost of the alternative currently under consideration. (USACE- Evaluation of Environmental Investments Procedures Manual)

Land Treatment Measures

measures that attempt to decrease runoff by increasing infiltration. Typical measures include contour plowing, land leveling, and crop residue use on crop land; brush control, range seeding, and farm ponds on pasture land; and tree management and fire control on forest land. In addition to reducing flood peaks, land treatment reduces flood damages by reducing the sediment content of water. (James and Lee, Economics of Water Resources Planning)

National Flood Insurance Program (NFIP)

The National Flood Insurance Program is managed and implemented through the Federal Emergency Management Agency in cooperation with local governments and property owners. (OPR)

Non-Market Evaluation Techniques

Techniques to estimate consumers' "willingness to pay" for goods and services not normally found in the marketplace. Examples of these techniques (which are most often used for estimating recreational benefits) include (USACE Planning Guidance):

- Unit Day Values Method: This method relies upon expert or informed opinion and judgement to approximate the average willingness to pay for recreational and other resources. Ranges of values can be assigned to specific activities, such as camping, fishing, hiking, etc.
- Travel Cost Method: This method approximates the average willingness to pay for recreational and other resources by estimating total travel expenditures to and from a recreational site. The basic premise is that per capita use of a recreation site will decrease as the out-of-pocket and time costs of traveling from place of origin to the site increase, other things remaining equal.
- Contingent Valuation Method: This method relies upon surveys of individuals to determine their willingness to pay for recreation or other resources. Individual values are then aggregated for all users of the resource.

Non-Structural Methods

Several definitions were found:

- Measures which reduce flood damages without significantly altering the nature or extent of flooding. They do this by changing the use made of the flood plains, or by accommodating existing uses to the flood hazard. Examples are flood proofing, relocation of structures, flood warning/preparedness systems, and regulation of flood plain use. (USACE Planning Guidance)
- Modifications in public policy, alterations in management practices, regulatory changes, or modifications in pricing policies that provide a complete or partial alternative for addressing water resources problems and opportunities. (USACE Planning Guidance)
- Methods requiring only incidental modification of the landscape or use of manufactured materials, e.g. floodways. (K. Turner)

Non-Traditional Methods

Methods that are not or rarely used in a region. Over time, non-traditional methods become

common. (K. Turner)

Planning Process

The process that individuals or groups go through in solving a particular problem, usually including steps such as: identification of problem and opportunities; identification of existing conditions; identification of stakeholders and objectives; identification of alternative plans and their evaluation; comparison and selection of plans; and monitor and adjust plans as necessary.

Preservation Values

Values that people place upon resources, even if they do not use them. These values include: (National Park Service, Economic Impacts of Protecting Rivers, Trails and Greenway Corridors)

- Bequest Value. The value that people place upon a resource with the knowledge that future generations will have the opportunity to enjoy that resource.
- Existence Value. The value that people place upon a resource that may be preserved in perpetuity, even if no recreational use is contemplated.
- Option Value. The value people place upon resources knowing that they will be available for future use.

Stakeholder

Several definitions found:

- A person or group having fee management or political interest in land or fauna improvements in the project area. (K. Turner)
- Any person or group showing a significant interest in a project. (Mine)
- A person or group who can stop you or whose support is necessary for success. (USACE Planning Manual)

Structural Measures

Collective term for those efforts that reduce flood damage by restricting movement of flood water into the floodplain. Examples include reservoirs and retarding structures which store peak flows, channel improvements and levees. (James and Lee, Economics of Water Resources Planning)

Traditional Measures

The historically common way to avoid or prevent flood damage, e.g. dams, levees or channels.

Watershed Management

A comprehensive approach to addressing issues which affect the function of a river system, including measures taken to improve water quality, erosion control, flood hazards, and habitat conservation. (OPR)

Willingness to Pay

In an economic analysis, the inputs and outputs of a project are valued on the basis of consumers' willingness to pay for them. Market prices may or may not reflect willingness to pay. If they do not, shadow prices must be used which are estimates of peoples' willingness to pay for goods and services, whether they are market or nonmarket goods and services. (Gregerson, Economic Assessment of Forestry Impacts)

A person or group of persons who can stop you or whose support is necessary for success. (USACE Planning Manual)